

§ 571.220 Standard No. 220; School bus rollover protection.

S1. *Scope.* This standard establishes performance requirements for school bus rollover protection.

S2. *Purpose.* The purpose of this standard is to reduce the number of deaths and the severity of injuries that result from failure of the school bus body structure to withstand forces encountered in rollover crashes.

S3. *Applicability.* This standard applies to school buses.

S4. *Requirements.* When a force equal to 1½ times the unloaded vehicle weight is applied to the roof of the vehicle's body structure through a force application plate as specified in S5., Test procedures—

(a) The downward vertical movement at any point on the application plate shall not exceed 5⅛ inches; and

(b) Each emergency exit of the vehicle provided in accordance with Standard No. 217 (§ 571.217) shall be capable of opening as specified in that standard during the full application of the force and after release of the force, except that an emergency exit located in the roof of the vehicle is not required to be capable of being opened during the application of the force. A particular vehicle (i.e., test specimen) need not meet the emergency exit opening requirement after release of force if it is subjected to the emergency exit opening requirements during the full application of the force.

S5. *Test procedures.* Each vehicle shall be capable of meeting the requirements of S4. when tested in accordance with the procedures set forth below.

S5.1 With any non-rigid chassis-to-body mounts replaced with equivalent rigid mounts, place the vehicle on a rigid horizontal surface so that the vehicle is entirely supported by means of the vehicle frame. If the vehicle is constructed without a frame, place the vehicle on its body sills. Remove any components which extend upward from the vehicle roof.

S5.2 Use a flat, rigid, rectangular force application plate that is measured with respect to the vehicle roof longitudinal and lateral centerlines,

(a) In the case of a vehicle with a GVWR of more than 10,000 pounds, 12

inches shorter than the vehicle roof and 36 inches wide; and

(b) In the case of a vehicle with a GVWR of 10,000 pounds or less, 5 inches longer and 5 inches wider than the vehicle roof. For purposes of these measurements, the vehicle roof is that structure, seen in the top projected view, that coincides with the passenger and driver compartment of the vehicle.

S5.3 Position the force application plate on the vehicle roof so that its rigid surface is perpendicular to a vertical longitudinal plane and it contacts the roof at not less than two points, and so that, in the top projected view, its longitudinal centerline coincides with the longitudinal centerline of the vehicle, and its front and rear edges are an equal distance inside the front and rear edges of the vehicle roof at the centerline.

S5.4 Apply an evenly-distributed vertical force in the downward direction to the force application plate at any rate not more than 0.5 inch per second, until a force of 500 pounds has been applied.

S5.5 Apply additional vertical force in the downward direction to the force application plate at a rate of not more than 0.5 inch per second until the force specified in S4. has been applied, and maintain this application of force.

S5.6 Measure the downward movement of any point on the force application plate which occurred during the application of force in accordance with S5.5.

S5.7 To test the capability of the vehicle's emergency exits to open in accordance with S4.(b)—

(a) In the case of testing under the full application of force, open the emergency exits as specified in S4.(b) while maintaining the force applied in accordance with S5.4 and S5.5; and

(b) In the case of testing after the release of all force, release all downward force applied to the force application plate and open the emergency exits as specified in S4.(b).

S6. *Test conditions.* The following conditions apply to the requirements specified in S4.

S6.1 *Temperature.* The ambient temperature is any level between 32° F. and 90° F.

S6.2 Windows and doors. Vehicle windows, doors, and emergency exits are in the fully-closed position, and latched but not locked.

[41 FR 3875, Jan. 27, 1976, as amended at 41 FR 36026, 36027, Aug. 26, 1976]

§ 571.221 Standard No. 221; School bus body joint strength.

S1. Scope. This standard establishes requirements for the strength of the body panel joints in school bus bodies.

S2. Purpose. The purpose of this standard is to reduce deaths and injuries resulting from the structural collapse of school bus bodies during crashes.

S3. Application. This standard applies to school buses with gross vehicle weight ratings of more than 10,000 pounds.

S4. Definitions. *Body component* means a part of a bus body made from a single piece of homogeneous material or from a single piece of composite material such as plywood.

Body panel means a body component used on the exterior or interior surface to enclose the bus' occupant space.

Body panel joint means the area of contact or close proximity between the edges of a body panel and another body component, excluding spaces designed for ventilation or another functional purpose, and excluding doors, windows, and maintenance access panels.

Bus body means the portion of a bus that encloses the bus's occupant space, exclusive of the bumpers, the chassis frame, and any structure forward of the forwardmost point of the windshield mounting.

S5. Requirement. When tested in accordance with the procedure of S6.,

each body panel joint shall be capable of holding the body panel to the member to which it is joined when subjected to a force of 60% of the tensile strength of the weakest joined body panel determined pursuant to S6.2.

S6. Procedure.

S6.1 Preparation of the test specimen.

S6.1.1 If a body panel joint is 8 inches long or longer, cut a test specimen that consists of any randomly selected 8-inch segment of the joint, together with a portion of the bus body whose dimensions, to the extent permitted by the size of the joined parts, are those specified in Figure 1, so that the specimen's centerline is perpendicular to the joint at the midpoint of the joint segment. Where the body panel joint is not fastened continuously, select the segment so that it does not bisect a spot weld or a discrete fastener.

S6.1.2 If a joint is less than 8 inches long, cut a test specimen with enough of the adjacent material to permit it to be held in the tension testing machine specified in S6.3.

S6.1.3 Prepare the test specimen in accordance with the preparation procedures specified in the 1973 edition of the Annual Book of ASTM Standards, published by the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

S6.2 Determination of minimum allowable strength. For purposes of determining the minimum allowable joint strength, determine the tensile strengths of the joined body components as follows: